

CLAIMS

Claims 1-31 (cancelled)

Claim 32 (currently amended): A method of forming a vibration damping system for a door assembly of an automotive vehicle, the door assembly including an exterior panel structure, the method comprising:

providing a hollowed metal door reinforcement, wherein the door reinforcement is a beam having an exposed external surface portion;

providing an expandable vibration damping material including an active polymer formulated in pellet form that is dry to touch and having a diameter that ranges from about 1.0 to about 20 mm, each pellet having an expandable foamable material, at least partially encapsulated in an adhesive shell;

applying, with an extruder and according to an automated process, [[an]] the expandable vibration damping material in a viscoelastic state such that the damping material flows onto the external surface portion and is in bonding contact over at least a portion of the exposed surface portion of the reinforcement prior to expansion, wherein the expandable vibration damping material is maintained in place on the external surface portion of the door reinforcement as the expandable vibration damping material hardens and bonds thereto;

mounting the door reinforcement, with the expandable vibration damping material thereon, to the door assembly such that the door reinforcement ~~bridges a door frame~~ spans fore-aft across a door and bridges the door assembly at a first and second end thereby positioning the expandable vibration damping material within a cavity between the door reinforcement and the exterior panel structure of the door assembly, wherein the expandable vibration damping material is maintained in place by one of its own external surfaces along a side portion of the door reinforcement within a portion of the cavity that is spaced apart from and generally opposing the exterior panel structure; and

expanding, by exposure to heat, the expandable vibration damping material across the cavity to contact and adhere to the exterior panel structure including [[the]] a door inner panel, a door outer panel, or both so as to expand and adhesively bond thereto;

wherein the expandable vibration damping material, during expansion thereof, fills [[a]] the cavity between the door reinforcement and the exterior panel structure for bonding the door reinforcement to the exterior panel structure such that the expandable vibration material cures and remains in place thereby providing a walled or expansive structure, which serves as a

vibration reducing medium acting to reduce vibration during use of the door assembly and operation of the vehicle;

wherein the expandable vibration damping material remains rigid at temperatures ranging from about -40°C to about 190°C, which are generally encountered by the exterior panel during operation of the vehicle.

Claim 33 (canceled)

Claim 34 (previously presented): A method as in claim 32 wherein the expanding of the damping material occurs during a painting operation performed upon the vehicle.

Claim 35 (currently amended): A method as in claim 32 wherein the step of applying the damping material is performed robotically so as to minimize the maintenance of wet or tacky mediums.

Claim 36 (previously presented): A method as in claim 32 wherein the step of applying the damping material includes extruding the damping material with a mini-applicator.

Claim 37 (canceled):

Claim 38 (currently amended): A method as in claim 37 further comprising:
allowing the material to return to [[its]] a generally dry substantially non-tacky state after extrusion onto the reinforcement thereby bonding the damping material to the reinforcement.

Claim 39 (previously presented): A method as in claim 32 wherein the damping material is applied as a single bead.

Claim 40 (previously presented): A method as in claim 32 wherein the damping material is applied as a plurality of nodes.

Claim 41 (currently amended): A method as in claim 32 wherein the reinforcement member is a door intrusion beam that is ~~metal and~~ tubular.

Claim 42 (previously presented): A method as in claim 32 wherein the reinforcement is an intrusion beam and the expandable damping material is extruded onto the intrusion beam by a supplier and then the beam is shipped to a vehicle manufacturer for assembly to the vehicle by the vehicle manufacturer.

Claim 43 (previously presented): A method as in claim 32 further comprising:
expanding the expandable damping material wherein the expandable damping material has an original volume prior to expansion and the expandable damping material expands to an expanded volume that is greater than 1000 % of the original volume.

Claim 44 (previously presented): A method as in claim 40 wherein the nodes of the plurality of nodes are in a random pattern after expansion thereby forming miniaturized chamber areas that absorb various vibrations and sound frequencies.

Claim 45 (currently amended): A method of forming a vibration damping system for a door assembly of an automotive vehicle, the door assembly including an exterior panel structure, the method comprising:

providing a[[n]] hollowed metal intrusion beam having a first end and a second end, the intrusion beam further having exposed surface portions between said first end and said second end;

providing an expandable vibration damping material including an active polymer formulated in pellet form that is dry to touch and having a diameter that ranges from about 1.0 to about 20 mm, each pellet having an expandable foamable material, at least partially encapsulated in an adhesive shell;

extruding an expandable vibration damping material onto the exposed surface portions of the intrusion beam while the expandable vibration damping material is in a viscoelastic state such that the expandable vibration damping material flows onto the surface portions;

allowing the expandable vibration damping material to bond to the surface portions of the intrusion beam, the expandable vibration damping material becoming substantially dry and tack free upon bonding to the intrusion beam, wherein the expandable vibration damping material is maintained in place on the external surface portion of the door reinforcement as the expandable vibration damping material hardens and bonds thereto;

transporting the intrusion beam with the expandable vibration damping material thereon;

mounting the intrusion beam to the door assembly with the expandable vibration damping material disposed thereon such that the door reinforcement spans fore-aft across the door and bridges the door assembly at a first and second end thereby positioning the expandable vibration damping material within a cavity between the door reinforcement and the external panel structure of the door assembly, wherein the expandable vibration damping material is maintained in place by one of its own external surfaces along a side portion of the door reinforcement within a portion of the cavity that is spaced apart from and generally opposing the external panel structure; and

expanding, by exposure to heat, the expandable vibration damping material across the cavity to contact and adhere to the exterior panel structure wherein the expandable vibration damping material expands to form a foam;

wherein the expandable vibration damping material, during expansion thereof, fills [[a]] the cavity between the door reinforcement and the exterior panel structure for bonding the door reinforcement to the exterior panel structure such that the expandable vibration material cures and remains in place thereby providing a walled or expansive structure, which serves as a vibration reducing medium acting to reduce vibration during use of the door assembly and operation of the vehicle.

Claim 46 (previously presented): A method as in claim 45 wherein the step of extruding the damping material is performed robotically.

Claim 47 (previously presented): A method as in claim 45 wherein the step of extruding the damping material is accomplished with mini-applicator.

Claim 48 (previously presented): A method as in claim 45 wherein the damping material is extruded as a single bead.

Claim 49 (previously presented): A method as in claim 45 wherein the damping material is extruded as a plurality of nodes.

Claim 50 (currently amended): A method as in claim 45 wherein the reinforcement member is a door intrusion beam that is ~~metal, tubular or both.~~

Claim 51 (previously presented): A method as in claim 45 wherein the expandable damping material is extruded onto the intrusion beam by a supplier and then the beam is shipped to a vehicle manufacturer for assembly to the vehicle by the vehicle manufacturer.

Claim 52 (currently amended): A method of forming a vibration damping system for a door assembly of an automotive vehicle, the door assembly including an exterior panel structure, the method comprising:

providing a[n] hollowed metal intrusion beam having a first end and a second end, the intrusion beam further having exposed surface portions between said first end and said second end;

providing an expandable vibration damping material including an active polymer formulated in pellet form that is dry to touch and having a diameter that ranges from about 1.0 to about 20 mm, each pellet having an expandable foamable material, at least partially encapsulated in an adhesive shell;

extruding an expandable vibration damping material onto the exposed surface portions of the intrusion beam while the expandable vibration damping material is in a viscoelastic state such that the expandable vibration damping material flows onto the surface portions, wherein the expandable vibration damping material is an ethylene based polymer material;

allowing the expandable vibration damping material to bond to the surface portions of the intrusion beam, the expandable vibration damping material becoming substantially dry and tack free upon bonding to the intrusion beam, wherein the expandable vibration damping material is maintained in place on the external surface portion of the door reinforcement as the expandable vibration damping material hardens and bonds thereto;

transporting the intrusion beam with the expandable vibration damping material thereon;

mounting the intrusion beam to the door assembly with the expandable vibration damping material disposed thereon ~~wherein the beam bridges a door frame of the door assembly at a first end and a second end of the frame~~ such that the door reinforcement spans fore-aft across the door and bridges the door assembly at a first and second end thereby positioning the expandable vibration damping material within a cavity between the door reinforcement and the external panel structure of the door assembly, wherein the expandable vibration damping material is maintained in place by one of its own external surfaces along a side portion of the door reinforcement within a portion of the cavity that is spaced apart from and generally opposing the external panel structure; and

expanding, by exposure to heat, the expandable vibration damping material across the cavity to contact and adhere to the exterior panel structure thereby serving to reduce the noise and vibration emanating from the door assembly wherein the expanding of the expandable vibration damping material occurs during a e-coat or paint processing performed upon the vehicle and wherein the damping material expands to form a foam;

wherein the expandable vibration damping material, during expansion thereof, fills the cavity between the door reinforcement and the exterior panel structure for bonding the door reinforcement to the exterior panel structure such that the expandable vibration material cures and remains in place thereby providing a walled or expansive structure, which serves as a vibration reducing medium acting to reduce vibration during use of the door assembly and operation of the vehicle;

wherein the expandable vibration damping material is extruded onto the intrusion beam by a supplier and then transporting of the beam includes shipping the beam to a vehicle manufacturer for assembly to the vehicle by the vehicle manufacturer; and

wherein the expandable vibration damping material is extruded as a single bead along a length of the beam; and

wherein the step of extruding the expandable vibration damping material is performed robotically.

Claim 53 (previously presented): A method as in claim 52 wherein the vibration damping material includes ethylene vinyl acetate.

Claim 54 (previously presented): A method as in claim 53 wherein the vibration damping material includes an epoxy resin.

Claim 55 (previously presented): A method as in claim 45 wherein the vibration damping material includes ethylene vinyl acetate or EPDM.

Claim 56 (canceled):